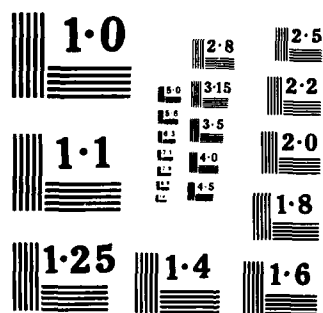


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PITFALLS IN FIGHTER FORCE PLANNING

Benjamin S. Lambeth

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PITFALLS IN FIGHTER FORCE PLANNING

Benjamin S. Lambeth¹

The Rand Corporation, Santa Monica, California

INTRODUCTION

The past few years have seen a vocal debate between top military leaders, civilian defense officials, and representatives of the aerospace industry, on the one hand, and a group of self-proclaimed "military reformers" made up of various Congressmen and like-minded commentators, on the other, over the issue of "quality vs. quantity" in U.S. tactical fighter modernization.² Much oversimplified, this debate concerns the question whether the United States should invest in high-technology force multipliers like the F-15, with its long-range radar and missile capability, or in larger numbers of simpler, more reliable, and less costly aircraft like the F-5 and F-20 at a time when our limited defense dollars face mounting demands from other sectors and the Soviet Union continues to field increasingly capable fighters of its own at a high rate.³

¹This paper was written for a conference on "Conventional Force Structure" sponsored by the Center for Strategic and International Studies, Georgetown University, Washington, D.C., January 29-31, 1985. Its main themes were first presented in a lecture to U.S. and Canadian fighter aircrews participating in Maple Flag X, CFB Cold Lake, Alberta, Canada, October 13, 1982.

²This debate was popularized several years ago in James Fallows, *National Defense* (New York: Random House, 1981), which openly argued on behalf of the reformers. The quality-quantity issue was first given systematic treatment, however, in Jack N. Merritt and Pierre M. Sprey, "Negative Marginal Returns in Weapons Acquisition," in Richard G. Head and Ervin J. Rokke, eds., *American Defense Policy*, Third Edition (Baltimore: Johns Hopkins University Press, 1973), pp. 486-495. That article remains widely regarded as the standard expression of the "quantity" position. For the other side of the story, see William J. Perry and Cynthia A. Roberts, "Winning Through Sophistication: How to Meet the Soviet Military Challenge," *Technology Review*, August 6, 1982, pp. 27-35. See also Lt. Col. Walter Kross, "Military Reform: Past and Present," *Air University Review*, July-August 1981, pp. 101-108.

³By one account, the Soviets are deploying new fighters faster than we are producing new air-to-air missiles to shoot them down. See Lt. James A. Winnefeld, Jr., "The Missing Link in Fighter Readiness," *U.S. Naval Institute Proceedings*, April 1984, p. 53.

This debate is far from peripheral to U.S. defense policy concerns. After all, U.S. Air Force and Navy tactical air-related accounts are currently consuming the lion's share of the general-purpose force budget. So the program stakes are high and the sources of the controversy understandable. Unfortunately, however, the debate has been so emotional and parochial on both sides that heat and acrimony rather than enlightenment have often appeared to be its predominant results. Furthermore, in my own judgment at least, the debate has expended much energy on false issues and obscured valid points on both sides of the argument.

To begin with, for all the talk about "quality vs. quantity," there has rarely been much said on behalf of "quantity" per se. There is widespread recognition even among the critics of our fighter procurement policy that the United States cannot emulate the Soviet Union in the numbers competition. For one thing, Americans have traditionally viewed pilots and aircraft as scarce assets rather than as counters to be expended in an attrition campaign. U.S. planners have always sought to maximize their effectiveness on each sortie so they might return to fly and fight again another day.

Second, even before "quality vs. quantity" became a vogue issue, there were all varieties of force ceilings within which our tactical air planners were obliged to operate. For years, the USAF used 26 active wings as a planning rule of thumb, irrespective of the aircraft developed over successive generations. Today, that ceiling has been raised to 40 wings. Even if this goal is eventually attained, however, we will still remain substantially behind the Soviets in total numbers of deployed fighters.⁴ Since our fighter inventory has necessarily

⁴The Soviet Air Force could outnumber the USAF in Central Europe by as much as three to one if it brought forward assets based within the USSR and included earlier-generation aircraft like the MiG-21 and Su-7. If NATO European fighters were introduced into the equation, the balance would look more like two to one or possibly less. But the Soviets are currently outproducing the United States in fighters by a factor of at least three. Moreover, despite a growth of some \$40 billion for general-purpose force enhancement since the beginning of the Reagan defense buildup, the total number of USAF and Navy fighter squadrons has increased only from 163 to 165.

remained limited in size, it has always made sense to strive for the highest "quality" that our technology could produce within affordable bounds.

Finally, contrary to widespread assumptions, "quantity" solutions are not self-evidently more affordable than our existing force development approaches. Even though we might be able to buy three F-5s or two F-20s for the cost of one F-15 (assuming such a policy would make sense on operational grounds), there would remain the problem of overhead and support. Larger numbers of aircraft require more ramp space, training space, replacement parts, and aircrews, among other things, with associated maintenance, life-cycle cost, and basing implications. In forward areas where our tactical air forces would be brought to bear in combat, the Navy is limited by the available deck space on its carriers and the Air Force by the number of operating facilities at its disposal. Even if the services were willing to buy cheaper fighters as attrition fillers, it does not follow that opting for such aircraft in lieu of more costly F-15s and F-14s would produce a commensurate growth in leverage by way of force expansion.

All things considered, then, the issue is not really about "quality vs. quantity" at all. It is about how *much* "quality" we should aim for in our fighter development strategy. More to the point, it is about disagreements over appropriate tradeoffs between force versatility (and associated complexity and cost), on the one hand, and simplicity (with its related ease of operability), on the other.

Here, there are problems on the other side of the debate. It has become fashionable for some proponents of high-end solutions to counter the "reformers" with the easy refrain that "American mothers won't allow their sons to go to war in an aircraft like the F-5"--implying the F-5 to be a low-"quality" machine well below the sophistication that U.S. technology can produce. Arguments of this sort claiming that prudence and common sense oblige us to buy the best available "quality" beg the question of "quality for what?" The F-5 and F-20 are "quality" aircraft by any standard of manufacturing elegance. They merely lack the breadth of performance offered by the F-15 and F-16 (at considerably higher cost). Furthermore, given the right scenario, both could do very well in combat, even against the most advanced Soviet fighters now in

service. So when we hear references to "quality," we must understand that to mean range of performance or extent of versatility, not merely technical sophistication. By that measure, the F-15 and F-18 are "quality" products because they can do things (such as front-quarter BVR intercepts and deep interdiction) that less robust fighters like the F-20 cannot.

If the key question is "quality for what," then we can ask how much of an aircraft's performance range is essential for mission needs and how much may be merely a product of routine overdesigning. Critics of the F-15 are on thin ice, I believe, when they fault the cost and complexity of its APG-63 radar and AIM-7F missile capability for being out of proportion to the few real-world circumstances in which it might prove operationally useful. Even in the absence of a reliable IFF system that might permit beyond visual-range rules of engagement, the side possessing a forward-hemisphere BVR capability can make the enemy predictable. That is a tremendous tactical advantage.⁵

But how about the Mach 2.5 speed parameter to which the F-15 was designed? That capability was built into the airplane in substantial part because the Soviet MiG-25 had it, not because of any requirement imposed by the airplane's intended operating context. Not only that, the MiG-25 was conceived solely as a high-altitude interceptor against bombers and reconnaissance planes penetrating Soviet homeland air defenses. As such, it was a platform that the F-15 would most likely never even see, let alone engage, in aerial combat.⁶ In retrospect,

⁵I do not believe the USAF has put forward its strongest argument in defense of the F-15's radar and missile capability. It is unconvincing to invoke the airplane's night and all-weather capability, since aerial combat does not take place inside clouds, the Soviet Air Force lacks a significant night attack capability, and without reliable IFF we will, in most cases, remain bound to visual rules of engagement. But the versatility afforded by being able to threaten the enemy with a missile shot in the face from beyond visual range (and to put the first missile in the air in a head-to-head engagement) is more than ample justification for such a capability.

⁶Note the comments by Lt. Viktor Belenko to this effect in John Barron, *MiG Pilot* (New York: Readers Digest Press, 1980). For a graphic illustration of how our early misapprehension of this "threat" influenced the performance specifications of the F-15, see also Keith Ferris's rendering of Fairchild Hiller's entry into the FX competition attacking a MiG-25 rolling into a hard defensive sliceback--a maneuver it was never built to perform--in *Armed Forces Management*, November 1969, p. 42.

Mach 2.5 may fall well within the "nice to have" category, but one must wonder at what cost it came in terms of the F-15's size and weight, complexity, reliability, and cost, to say nothing of lost opportunities to apply elsewhere (perhaps toward readiness enhancement) the savings that might have been afforded by a more relaxed Vmax requirement.⁷

All of this is to say that "quality vs. quantity" is a very misleading characterization of our tactical air modernization conundrum. The real issue is *how much* "quality," across what performance spectrum, in what force mix, numerical strength, and sustainability, do we need to give us our desired mission-effectiveness for most plausible scenarios at a cost we can afford? As every force planner knows, satisfactory answers must take account of much more than just considerations of force size and composition. They must also consider such factors as life-cycle cost, maintainability, basing and logistics, and training. It is through tradeoffs among *all* these considerations, not just between "quality" and "quantity," that planners strive to build a rational force structure.⁸

Obviously, any effort to sort out these tradeoffs must pay careful attention to the likely environments in which our fighter forces might be called upon to perform. It is here where our planning has typically come up against the problems that have given rise to the "quality-quantity" debate in the first place. Although we routinely talk about our requirements as a function of the "threat," all too often the assessments that go into tactical force planning look solely to the

⁷I am not questioning the need for a lot of excess power in a modern air superiority fighter. Indeed, the ability it can provide to outaccelerate an enemy from low speed to corner velocity (the speed that offers maximum turning performance) and from corner to supersonic can make the crucial difference between survival and disaster. But reaching out to Mach 2.5 requires more than just the margin of excess power needed for maintaining an edge in maneuvering engagements. It also demands a variety of airframe refinements, such as variable inlets, that are tremendously complex and expensive for the limited value they offer in most situations. We have gradually come to recognize this in the F-16 and F-18, which compare favorably to the F-15 in the air combat maneuvering arena but lack its top speed by a considerable margin.

⁸There are also nonrational influences on the force development process that bear noting, such as intervention by Congress in directing the Air Force to buy additional increments of aircraft (most recently the A-10) that it has not planned for and does not want.

technical aspects and size of the enemy's forces, without much thought given to considerations of context or to those important intangibles relating to the enemy's operational prowess that will govern how--and with what effect--his technical assets might perform in combat.⁹

We need to assess enemy capabilities not just in terms of hardware but from an operational perspective. For one thing, that is the context in which we will fight the Soviets should war come. More important, assessments of enemy capability divorced from an operational setting tend to produce misleading images. At one extreme, U.S. fighter programs are all too often bolstered in the annual budget cycle by worst-case analyses that routinely paint the Soviets ten feet tall and overlook the various limitations, shortcomings, and weaknesses that would influence Soviet combat effectiveness in practice.¹⁰ Conversely, some studies dismiss the Soviet fighter pilot as an unthinking automaton with shoddy equipment and little ability to extract much benefit from his weapons platform, thus implying that the adversary is, at best, a dwarf.¹¹

Force planners as well as operators need to avoid both tendencies. The best antidote is a balanced approach that weighs the technical side of enemy capability in the cold light of operational reality--with due acknowledgement of enemy vulnerabilities as well as strengths.¹² This

⁹Consider, for example, this statement by a former staff officer in the USAF's Directorate of Operations: "The USSR is building about 1300 fighters every year--three or four times our production rate. Not only is the number of Soviet fighters increasing, the quality of those fighters is improving as well. Notable improvements include all-weather missiles, long-range radars, and low-altitude capability. Such a threat is the driving factor in the way USAF planners are structuring future fighter buys." Maj. Dick Anderegg, "Meeting the Threat: Sophistication vs. Simplicity," *USAF Fighter Weapons Review*, Fall 1982, p. 2. There is nothing wrong with this formulation as far as it goes. But it describes only one dimension of the threat as it would probably manifest itself in actual combat.

¹⁰The treatment of Soviet air combat capability in the Defense Department's latest edition of *Soviet Military Power* (Washington, D.C.: Government Printing Office, 1984) can be faulted on this ground.

¹¹This is a cardinal failing of Andrew Cockburn's *The Threat: Inside the Soviet Military Machine* (New York: Random House, 1983), a tendentious broadside against U.S. defense policy that catalogues Soviet weaknesses in great detail but conveniently ignores Moscow's many countervailing strengths.

¹²As Maj. Gen. Jasper Welch, Jr., USAF (Ret.), nicely put this

means looking beyond equipment and order of battle to such factors as training and tactics that will largely determine the actual leverage of Soviet hardware in battle. To be sure, the answers are not easy and will invariably involve substantial judgment. It seems clear, however, that satisfactory tradeoffs among the many options facing the tactical air planner will depend at least as much on the likely character of a future war and the degree of enemy prowess in it as they will on the numbers and performance of enemy weapons per se.

This paper approaches the problem of fighter force development by examining four recurrent mistakes we tend to make in requirements generation. It does *not* aim to criticize existing force structure. I find that endeavor rather unhelpful. For all its strengths and deficiencies, our current fighter inventory is going to be with us for many years. Whatever improvements that may occur in the meantime will, for the most part, be incremental and along the margins. Accordingly, rather than venture yet another personal opinion as to what the "ideal" fighter force should entail, I would prefer to think about our fighter needs in a way that might help us steer away from some of the pitfalls that have caused us to misdirect our force modernization efforts in the past. *... to the point of the following suggestion:*

To be sure, there is little chance that better threat assessment and requirements generation will permit fighter force solutions less costly than those now in train. Nevertheless, I am persuaded that excessively technical threat portrayals can yield serious imbalances between our perceived operational "requirements" and our actual needs for most real-world contingencies. To this extent, a broader conception of the threat and its force-posture implications might afford us more rational force mixes, greater availability, and better employment doctrines than those emanating from our existing approaches to force design.

point some years ago. "there is a certain unbecoming fatalism about routinely allowing the Soviet military a free ride on their existing vulnerabilities just because we might be wrong or they 'might' fix them." "A Conceptual Approach to Countering Invasion Threats to NATO" (unpublished manuscript, June 1976).

¹³The discussion that follows mainly addresses USAF concerns. However, insofar as it deals with generic problems of threat assessment and requirements definition, it should have a bearing on naval fighter force planning as well.

CONFUSING NUMBERS WITH STRENGTH

Fixation on force size as the most important ingredient of enemy capability is a classic case of bookkeeping masquerading as analysis. It overlooks the dynamic elements of war, including such factors as the starting conditions and geostrategic context of the conflict, the leadership and tactical concepts available to each side, and the competence of those responsible for translating hardware into combat performance--to say nothing of such imponderables as Clausewitz's "friction" and Machiavelli's *fortuna*. The result of this reductionist approach is all too often a mistaken impression that war is merely a firepower equation writ large and that favorable asymmetries in the numbers balance can be automatically traded for battlefield gains.

To be sure, no commander would argue that numbers are unimportant in air warfare. Obviously he would prefer as large an aircraft and weapons inventory as his manpower and logistics net might support. Numerical abundance is particularly desirable for any offensive concept requiring attrition fillers to assure continued persistence. Even with all allowances for its artificialities, the ACEVAL test of 1976 bore out the axiom suggested by Lt. Col. Barry Watts that "with skilled adversaries on both sides, engagement exchange ratios tend to diminish rapidly as the number of independently maneuvering participants goes up--regardless of qualitative differences between opposing aircraft."¹⁴

¹⁴"Fire, Movement, and Tactics," *TOPGUN Journal*, Fall/Winter 1979, p. 24. Watts further cites a USAF Aggressor pilot, Maj. Lee Harrell, as having recounted the following conclusion after two weeks of multiparticipant ACM involving 6 F-5s against 4 to 6 F-15s: "Once we got into the 'knife-fighting' portion, the F-15's kill ratio was distinctly less than 1:1. Overall, with no visual identification required prior to shooting, it was slightly better than 1:1. But once the fight matured, the Eagle died like everyone else" (p. 18). I observed the same phenomenon from the back seat of a TOPGUN F-5F in August 1980 during a massed air battle over San Clemente Island pitting some 8 F-5s and 6 A-4s capping 6 F-105 strikers against 8 F-14s and 4 F-4s in a block of airspace 20 miles across. The F-14s, being the biggest targets in the sky, were among the first kill removals once the engagement was joined. During the mass debrief afterwards, it was determined that roughly two shots were called for every shot observed, confirming the general rule that in multiparticipant ACM, it is the unseen adversary who is likely to score the most. "In this sense at least," as Watts concludes, "numbers do count" (p. 24). Of course, one would expect a different outcome with widely asymmetrical pilot skill

Nevertheless, numerical superiority can never offer "instant courage" to planners, be they Soviet or any other. It can even be irrelevant if unaccompanied by other assets in the qualitative realm or opposed by a force smaller yet superior in leadership and adaptability. An interesting illustration can be found in the Franco-German military standoff just prior to World War II. By most of the measures used in military balance assessment, the French looked very good compared to the Germans on paper. Yet they promptly collapsed under Hitler's offensive as a result of their maldeployment in the face of an adversary willing to risk striking first with a clear set of tactical goals.¹⁵ An even better example is offered by Israel's performance in the various Middle East air wars of the past two decades. The Israeli Air Force has been outnumbered as much as four to one by enemy aircraft of comparable performance and has consistently prevailed by margins bordering on the astonishing. The compensating factor, which I will address below, has been Israel's well-known advantage in technical and operational macrocompetence.¹⁶

In sum, while numerical superiority offers great *potential* value, it can rarely decide combat outcomes by itself. Assuming comparable weapons on both sides, larger numbers of fighters poorly flown can be defeated by smaller forces operated to maximum performance. Furthermore, large fighter inventories require large numbers of pilots for their quantitative edge to be converted into tactical leverage. This will almost certainly mean a progressive decline in the proficiency of the aircrew cadre toward the tail of the distribution, since exceptional air combat skill emanates from unique personality traits

levels on the two sides, as the Israeli Air Force demonstrated against the Syrians over the Beka'a Valley in 1982. On the latter case, see Benjamin S. Lambeth, *Moscow's Lessons from the 1982 Lebanon Air War* (Santa Monica: The Rand Corporation, R-3000-AF, September 1984).

¹⁵For discussion, see Jeffrey Record, "France 1940 and the NATO Center 1980: Some Disquieting Comparisons," *Strategic Review*, Summer 1980, pp. 67-74.

¹⁶I have heard some Israeli pilots express an outright *preference* for fighting outnumbered in multiparticipant air combat, on the grounds that maintaining mutual support among smaller forces (assuming a clear advantage in air discipline and pilot skill) is more easily manageable and that larger numbers of enemy fighters present a richer target array with more shot opportunities.

that that can be nurtured but not mass-produced.¹⁷ It is very hard, even through the most vigorous and well-funded training programs, to match large fighter forces with uniformly outstanding aircrews.¹⁸

Finally, large fighter inventories unsupported by adequate munitions stocks and sustainability are effectively useless. At a minimum, of course, numerical advantages can provide an edge in reserves to those willing to compensate for qualitative inadequacies by absorbing the high loss rates that would be required to produce leverage from superior numbers. In no case, though, can a favorable numerical ratio guarantee success merely on the strength of its existence. To assess the real significance of numerical asymmetries, one must look to the larger setting in which they reside. The complex dimensions of that setting can never be properly understood by assessments that consider only the "bean-count" elements of opposing fighter forces.¹⁹

¹⁷For powerful evidence in support of this proposition, based on extensive interviews of fighter pilots with World War II, Korean War, and Southeast Asian air combat experience, see Edward W. Youngling and others, *Feasibility Study to Predict Combat Effectiveness for Selected Military Roles: Fighter Pilot Effectiveness*, Report No. MDC E1634 (Saint Louis: McDonnell-Douglas Corporation, April 29, 1977). As a general rule, some 90 percent of the aces are represented by no more than 5 to 10 percent of the total pilot cadre.

¹⁸Such a view seems to have been suggested some years ago by Maj. Gen. Ezer Weizman, the former Israeli Air Force commander, in an interview in which he was asked to account for the uniformly high quality of the relatively small IAF fighter pilot contingent: "The U.S. Air Force is a clear criterion. It is very big, very serious, and more experienced today in combat than any other air force. No other air force can serve as a yardstick.... When I put Israeli pilots up against American pilots, I see that in some respects the Israeli boys are better. I want to stress that I am talking about the average. It's possible that if we had to field 4,000 pilots, then we would have to lower the level." Quoted in Ze'ev Schiff, *A History of the Israeli Army, 1870-1974* (San Francisco: Straight Arrow Books, 1974), p. 199.

¹⁹Napoleon was fond of saying that "there is nothing in warfare more important than unity of command." By virtue of its General Staff system, centralized decisionmaking approach, combined-arms mission apportionment, and unified alliance under a common doctrine, among other things, the Soviet military takes some pride in believing that it enjoys this critical prerequisite. Whether or not it does in fact, one would never know just by looking at the quantifiable indicators of Soviet capability.

Today, the overwhelming emphasis is on the European scenario in our acquisition strategy and contingency planning. Preparation for NATO defense has centered on expectations that the initial assault will come in the form of an elaborate "air operation" involving upward of 2000 Soviet aircraft. Likewise, planning for the counteroffensive campaign has concentrated on engaging and destroying Soviet second-echelon forces through deep interdiction, while simultaneously breaking up advancing Soviet armor through timely employment of close air support. In both cases, the underlying strategy seems directed toward grinding down Moscow's offensive momentum.

All of this may be necessary for deterring a Soviet attack against NATO in the first place, but it definitely comes at a high price in terms of reduced capacity for coping with other variants of air warfare, especially in non-NATO contingencies. The elaborate systems built into our fighter force at such cost and sacrifice in overall size and sustainability could be rendered moot by a Soviet offensive, whether in Europe or elsewhere, that fell outside the boundaries of what we had planned and trained to accomplish. Even for more benign scenarios, major compromises have been imposed as a result of disproportionate stress on selected portions of the force-structure problem at the expense of others.

One good example is the widely-noted "munitions mess" that has been allowed to develop in the wake of our heavy investment in expensive fighter platforms, while slighting parallel procurement of the sort of ordnance that would make their trip through a highly-defended target area worthwhile. A particular problem in this regard is our lack of good hard-structure munitions for airfield attacks and our inadequate supply of wide-area weapons for engaging Soviet follow-on forces. A severe shortage of air-to-air missiles for a serious showdown over Central Europe is yet another problem of this sort. A ballpark guess is that we have enough missiles in the forward theater for about two days of intensive air combat, assuming a full weapons load for each aircraft

the base in time for the two of them to get their stories straight before the investigation." *The Right Stuff* (New York: Farrar, Straus and Giroux, 1979), p. 31.

This tendency took further root during the McNamara years, when the enshrinement of cost-effectiveness led to increased stress on common systems bearing multimission capabilities. In the case of the early nuclear scenario, the effect was to respond to requirements for the most demanding yet least likely contingency, with a consequent neglect of other possible air employment situations. Under McNamara's influence, our quest for a more uniform force structure designed for diverse operations (primarily against Soviet forces) led to a *reduction* in force versatility for other variants of combat through design oversights and a faulty belief that what could lick the cat could also lick the kitten.

The unanticipated demands of the Vietnam war starkly dramatized the price of such narrow planning guidance. The F-105, optimized for high-speed nuclear weapons delivery against area targets in Eastern Europe, lacked both the system redundancy to sustain heavy damage from automatic weapons fire and the maneuverability to engage in aerial combat against North Vietnamese MiGs. The F-4C, similarly designed to maritime air defense requirements and only later bought by the Air Force for multimission duties in keeping with McNamara's stress on "commonality," lacked a gun or a lead-computing optical sight, since prevailing wisdom held that air-to-air missiles had consigned "traditional" air combat to the past. As a final telling point, because our fighter crews had trained predominantly for nuclear delivery, they found themselves ill-equipped in the early phases of the Vietnam war for conventional strike operations in the face of heavy SAM/AAA defenses and for maneuvering combat against NVAF MiGs.³⁸

³⁸This stress on the nuclear mission was matched by a pronounced dominance of flying safety over training realism in obstructing the development of refined air-to-air skills during the early 1960s. Both the circumstances and the spirit of that era have been splendidly evoked in the following passage by Tom Wolfe: "Hassling--mock dogfighting--was strictly prohibited, and so naturally young fighter jocks could hardly wait to go up in, say, a pair of F-100s and start the duel by making a pass at each other at 800 miles an hour, the winner being the pilot who could slip in behind the other one." In these contests, it was not uncommon for an inexperienced pilot to fly his aircraft flat out of control, whereupon "he has to eject ... and he shakes his fist at the victor as he floats down by parachute and his half-a-million dollar aircraft goes *kaboom!* on the palmetto grass or the desert floor, and he starts thinking about how he can get together with the other guy back at

until recently, compared to our pursuit of technical innovations designed to keep us ahead in the hardware competition.

SCENARIO-SPECIFIC REQUIREMENTS GENERATION

A final pitfall in operational planning is the highlighting of worst cases in the most stressful potential theaters, and then designing our forces against the special requirements posed by those scenarios with insufficient concern for other, less demanding but more likely circumstances in which U.S. tactical airpower might become committed.

During the 1950s, when life was simpler, fighter requirements tended to be submitted to industry in fairly broad terms. Within specific mission tasking, employment planning and training were done without special regard for particular theaters or combat scenarios. TAC's 19th Air Force was responsible for deploying Composite Air Strike Force packages on short notice to *any* potential trouble spot, with whatever mix of fighters, munitions, infrastructure, and tanker support that might be required for the needs of the moment. However primitive those approaches may have been compared to our current practices, they at least sought to match missions with appropriate hardware and to provide comprehensive coverage of all conceivable demands that might be levied on the tactical air forces--at a time well before "flexibility" had become a popular term.

In more recent years, force development has become more and more dominated by situation-specific planning. This trend first developed on the heels of the "massive retaliation" strategy in 1955, which stipulated that any global conflict would assume nuclear proportions almost from the outset. The result was a singular fixation on the nuclear strike role in tactical force planning and a commensurate decline in planning and aircrew training for nonnuclear missions.³⁷

³⁷Evidence of this narrow fixation can be found in the Commander's directive published in the PACAF F-100 pilot training manual in 1961: "Nuclear training will in every instance take precedence over nonnuclear familiarization and qualification. It is emphasized that conventional training will not be accomplished at the expense of the higher priority nuclear training required by this manual. Non-MSF units will restrict conventional familiarization to the accomplishment of only one event per aircrew per year." *Aircrew Training Manual for F-100D/F*, PACAFM 51-6, Vol. I, March 1, 1961.

fighter modernization will yield commensurate returns in Soviet combat effectiveness. Even in the worst case, there is much that our own tactical air forces can do solely through better training and support for improved readiness and sustainability to stay ahead of technical improvements in the Soviet fighter posture.³⁵

On balance, any honest appraisal of the threat needs to account not just for its size and technical sophistication, but also for the nature and quality of the tactics and training that would govern its combat employment. Such a broadened view of "quality" defined in *operational* as well as hardware terms would not only permit a more realistic appreciation of our adversaries' comparative strengths and weaknesses; it might also suggest imaginative solutions to our tactical air challenges that would not, in every case, necessarily require major R&D programs or high cost.³⁶ To cite only one example, we have known for years that Soviet fighter aircrews are heavily tied to GCI and largely denied the autonomy that figures so centrally in Western air combat doctrine. Yet our efforts to exploit that vulnerability through such measures as communications jamming and tactics aimed at making the most of resultant enemy disruption have been remarkably desultory, at least

³⁵The idea that definitions of weapons performance should take into account not just air vehicle characteristics, but also considerations of basing, maintainability, and sustainability, is developed in M. B. Berman with C. L. Batten, *Increasing Future Fighter Weapon System Performance By Integrating Basing, Support, and Air Vehicle Requirements* (Santa Monica: The Rand Corporation, N-1985-1-AF, April 1983). For a related argument that "effecting the necessary improvements in readiness and sustainability will require fundamental changes in the way the Air Force perceives weapon system requirements, develops and procures those systems, manages logistics resources, and organizes and operates combat support systems," see also Michael Rich, William Stanley, and Susan Anderson, *Improving U.S. Air Force Readiness and Sustainability* (Santa Monica: The Rand Corporation, R-3113/1-AF, April 1984).

³⁶Operators are way ahead of their intelligence counterparts in honoring this outlook. In a recent reflection on the USAF Fighter Weapons School's curriculum, the Outstanding Graduate for 1983 recounted how the various courses "developed at a fighter pilot's interest (and comprehension) level ... not only stress the capabilities of the threats, but also address their weaknesses and ways to defeat them." The result, he added, is "the realization that the enemy is not always ten feet tall, contrary to the theme of most intelligence briefings I'd attended." Capt. Al Granger, "In Retrospect and Perspective," *USAF Fighter Weapons Review*, Fall 1984, p. 33.

would naturally dominate by virtue of their superior weapons, perhaps by taking head-on shots from beyond visual range before a maneuvering engagement was ever joined. Yet it remains axiomatic in the fighter business that you fight like you train. Why should young F-14 and F-15 pilots who repeatedly allow themselves to slow down and lose in maneuvering engagements against well-flown fighters of lesser technical sophistication in peacetime training somehow be expected automatically to muster the air discipline and proficiency that would be required to convert their technical performance advantages into operational leverage in the heat of battle? And what does this tell us about the probable performance of *Soviet* aircrews, with all their known deficiencies in initiative and free air combat, flying aircraft like late-model MiG-21s and the MiG-23?³³

The Soviets are now deploying two new fighter types with performance attributes apparently comparable to those of the F-15 and F-16.³⁴ They may also be close to acquiring an all-aspect missile capability on a par with that of the AIM-7F and AIM-9L. Yet for the Soviets to extract full value from these developments, they will have to abandon a long-standing indisposition to allow their pilots much latitude for individual initiative and free play. This could occur over time as the Soviet Air Force grows more confident in its command and control and expanded flexibility. In the absence of parallel changes in operating style, however, it is far from obvious that advances in Soviet

³³A Rand colleague with fighter background suggested that an earlier draft of this paper was too heavily focused on air-to-air at the expense of other, more important tactical missions. I agree that the fighter problem entails more than just one-on-one (or few-on-few) air combat maneuvering, where so many of the "quality vs. quantity" arguments tend to degenerate and where debating points so often are won or lost. It concerns tactical air warfare across the board, including a healthy measure of ground-attack applications that get discussed far less frequently. However, I also submit that *whatever* your mission may be, if you are rolling in on a target and happen to be engaged by a MiG, you are now 100-percent air-to-air at that moment and had best have the equipment and skills to negate the attack.

³⁴These aircraft, the MiG-29 and Su-27, are reportedly optimized for air-to-air combat and feature exceptional acceleration, medium-range missiles with active terminal guidance, and pulse Doppler fire-control systems with extended-range, track-while-scan radars. See Clarence A. Robinson, Jr., "Soviets Deploying New Fighters," *Aviation Week and Space Technology*, November 28, 1983, pp. 18-20.

employed, but also on such factors as command and control, the astuteness of force commitments, and the tactical acumen, inventiveness, initiative, air discipline, and stick-and-rudder skills of the aircrews involved.

To be sure, we are far from lacking in insight into Soviet tactical air training and proficiency. Yet this awareness rarely intrudes in any systematic way into the force development process. Obviously it would be irresponsible to suggest cutting corners in that process on little more than an untested hunch that the Soviet Air Force faces problems in extracting the full benefit from its hardware. All the same, it is an overstatement, I believe, to assert as a general rule that "to send a young American into battle in an F-5 against a Russian MiG-23 is to make cannon fodder of him."³¹ Even the less agile F-4 (with the added liability of a smoke trail that can be seen twenty-five miles away) flown by experienced Air National Guard crews beats up with embarrassing regularity on F-15s in the hands of less seasoned regular Air Force pilots in routine training. The same is true of Navy A-4s and F-5s flown by well-trained adversary pilots against fleet F-14 aircrews.³² One could, of course, counter that in "real" combat, the F-14 and F-15

³¹Lt. Gen. Kelly Burke, USAF (Ret.), former USAF Deputy Chief of Staff for Research and Development, quoted in Ernest Conine, "Shopping for Military Quality: U.S. Technical Complexity Eases in Push for Reliability," *Los Angeles Times*, May 7, 1981. This would depend entirely on the situation. The MiG-23 is known to have poorer turning performance than even a hard-wing F-4. Although it exceeds the F-5 by a considerable margin in acceleration and top speed, I know many an Air Force Aggressor and Navy TOPGUN instructor who would relish going head to head with his Soviet counterpart in a MiG-23 in an isolated engagement. Of course, the USAF would be foolhardy to rely on an aircraft like the F-5 to hold off a massed Soviet offensive against NATO using forward-aspect tactics. But that is a different matter. It does not mean that a well-flown F-5 would be "cannon fodder" against a MiG-23 in the hands of a typical Soviet fighter pilot in a less demanding situation where we might not want to commit our most valuable assets.

³²I am not suggesting that we can get by with an elite corps of case-hardened Air Guard heads squeezing the last ounce of performance out of scruffy old F-4s. I *am* arguing that this recurrent pattern means that our younger F-15 pilots may need more intensive and realistic air combat training than they are now getting. Given its far superior capabilities, there is no excuse for the F-15's not *always* winning against lesser aircraft, especially when our fighter force is quantity-limited to begin with.

of the opposed aircraft are *potential* threat variables, their practical import will depend heavily on the aggressiveness, situation awareness, tactical adroitness, and airmanship qualities of their pilots. Just as an experienced aviator can consistently defeat a less accomplished adversary flying a superior aircraft with more sophisticated and versatile weaponry, a marginal pilot even in the world's best fighter who cannot operate his aircraft to the edge of its envelope might as well be in a less capable machine for all practical purposes. On this score, it is hard to quarrel with the following admonition by retired Navy Capt. Jerry O'Rourke: "A fighter pilot must use his airplane right up to its limits in his routine flying, be it combat or training for combat. These fine edges between what the plane can do and what it cannot are his ballpark. The mark of the true professional is his ability to get into that ballpark and to drive his enemy out. So he must *use* his airplane and his weaponry right up to these limits. If he doesn't--if he reserves a little cushion for safety, or for the wife and kids, or for any lack of personal confidence--he's not really a fighter pilot, and, when combat comes, he'll soon be beaten by one who is."³⁰

This applies to more complex multiparticipant confrontations as well. Such engagements will not just be between opposed *aircraft*, but between opposed *forces* (including people and tactical concepts as well as the hardware). In all cases, the relative performance of the two sides will hinge not just on the technical features of the weapons

³⁰"Fighters That Never Got to the Fight: Part II," *U.S. Naval Institute Proceedings*, April 1982, pp. 76-77. This view comes close to being an axiomatic belief in the Israeli Air Force. As one of their training manuals reportedly notes, "our strength is based mainly on the pilot and not on the weapon system.... Top-grade pilots will achieve magnificent results even with less superior aircraft, but the bad pilot in a good aircraft has no impact on the aircraft's characteristics. Moreso, there is a great probability that the pilot will kill himself" (quoted in Ethell, *op. cit.*, p. 107). It is a view that should command great respect in the West. But it also requires two qualifications today. First, current-generation fighters like the F-15, with their superior handling characteristics and thrust-to-weight ratios, have the capacity to allow even poorly-trained aviators to recover from combat situations that would be fatal in a less responsive aircraft. Second, once both sides possess all-aspect missiles like the AIM-9L, asymmetries in pilot skill will become notably overshadowed by the increased lethality of the weapon. Even a hamfist with a reliable front-quarter shot capability should be considered--and probably will be--dangerous.

No one in the fighter business would fault commanders for hedging against worst cases in their tactics development and training. We must also, after all, avoid the pitfall of overconfidence. It is only prudent to train aircrews to assume that every enemy pilot is the world's best until he proves otherwise by his mistakes.²⁹ Yet for those ultimately responsible for force planning to fixate solely on the nuts and bolts of enemy airpower, without regard for how it might be employed, is an invitation for misrepresenting the threat and passing up potential opportunities for exploiting enemy weaknesses.

I know of no senior officer who does not intuitively agree with this dictum. Yet ironically, our standard approach to balance assessment remains the juxtaposition of opposing weaponry in scenarios whose only variables are those amenable to quantification and whose outcomes are solely derivative from measurable asymmetries, such as total force numbers, their respective sortie generation capability, and the relative lethality of their weapons--perhaps with an assumption or two about "air doctrine" thrown in for good measure. The predictable result is a caricature of air warfare as merely a confrontation of countervailing machinery.

Yet every lieutenant who has been through his first humbling experience at being forced into an overshoot and subsequently "killed" by his instructor in basic fighter maneuvers training knows that in real combat, the enemy is not just the other airplane but also the man behind the stick. Although the acceleration, turning performance, and agility

²⁹One can, of course, be cautious to a fault in this respect. Lt. Col. Mike Press, a former USAF Aggressor Squadron commander, pointed out several years ago how the very success story of the Aggressors and TOPGUN may ironically have had a negative influence on the air combat proficiency of our line squadrons: "Every time the young lad makes a mistake, he gets his brains blown out by the old pro. Our young fighter pilot is now conditioned to the fact that if he makes the slightest error in combat, he'd better bug out or be killed. One might argue that this is not a bad way to train because it teaches perfection and also trains to the worst threat. [But] it also breeds psychological inferiority, unproductive caution, and an unrealistic estimation of the enemy's capability. Certainly you want to eliminate mistakes in air combat, but if you run away every time you take a shot at a MiG and miss, there will be a lot of grateful MiG pilots around the world." "Aggressor Reflections," *USAF Fighter Weapons Review*, Summer 1981, p. 3.

Numerous reasons account for our tendency to think about the threat in technical rather than operational terms. For one thing, tracking the enemy's forces is easier than assessing his operational prowess, since information on the latter is generally fragmentary, elusive, and unsusceptible to quantification. Furthermore, there are natural temptations to size up the enemy by the same yardstick we typically use in appraising our own capabilities. As the late Herbert Goldhamer once observed, "the belief that the enemy is like oneself ... may derive from certain assumptions concerning the uniformity of military practices arising from a common international technology and military culture.... This reduces incentives to study some aspects of the enemy and encourages the tendency to impute to him interests, attitudes, and behavior similar to one's own. Emphasis on the technical aspects of military culture may provide incentives to discover whether other nations have developed a new or superior weapon or introduced other technical innovations, but may discourage the observation and perception of nuances in the enemy's tactical and doctrinal preferences and cultural, political, and social tendencies that influence both his military intentions and his military behavior."²⁸

Obviously the size and technical characteristics of an enemy fighter force are important aspects of its threat potential. No less important, however, are those factors related to employment and adaptability that will also heavily influence its effectiveness under stress. Assessing the "threat" dimensions of enemy airpower without careful attention to these variables, however ambiguous and resistive to measurement they may be, is tantamount to looking for one's keys where the light is best.

²⁸As a result, Goldhamer concluded, we are left with an image of enemy capability uninformed by any consideration of those operational practices that might uniquely influence the way in which the static elements of enemy power would be translated into actual combat performance: "U.S. scenarios certainly take account of differences in the order of battle of the two antagonists, and in some doctrinal and tactical characteristics stemming largely from an assumed Soviet offensive posture, but otherwise tend to treat Red and Blue as mirror images of each other." *Reality and Belief in Military Affairs: A First Draft* (Santa Monica: The Rand Corporation, R-2448-NA, February 1979), pp. 22-23.

IGNORING THE HUMAN FACTOR

Describing the threat solely in terms of measurables, without regard for the many qualitative factors that would affect its performance in combat, is the single most troublesome deficiency of U.S. tactical air threat assessment. Although this practice may not invariably exaggerate the threat, it can be counted on to produce an incomplete and misleading portrait of enemy capability.

This approach has not been an exclusive failing of the American defense community. Consider the following reflection by the former commander of the Israeli Air Force, Maj. Gen. Ezer Weizman, describing his reason for replacing his top intelligence officer upon assuming command:

You give me the facts, but you don't analyze them correctly. You tell me that the Egyptian pilot (and there are such and such number of pilots) flies such and such number of hours in his plane (and there are such and such number of Egyptian planes), which leads you to conclude that this represents such and such an amount of strength and such and such superiority over our own forces. But your equation needs thought and analysis. What does the Egyptian pilot do during those hours of flying? Is he really learning and making progress? A correct evaluation of an air force isn't just knowing how many planes it has, and what type, and how many pilots have been trained to fly them. You must add further factors to your equation: the pilot's aptitude, his morale, his motivation, his character, the abilities of his officers, the tactical and strategic notions of his commanders. That is the sum total of its strength, and not dry figures.²⁷

The wisdom of this view has been amply borne out by Israel's combat performance. Against substantial odds, the IAF has repeatedly posted dramatic successes as a result of its superiority in leadership and pilot skill. As a general rule, it recognizes the impossibility of competing against the Arab coalition numerically and strives to compensate for enemy quantitative supremacy by ensuring its own edge in manpower quality and tactical ingenuity.

²⁷*On Eagles' Wings* (Tel Aviv: Steimatsky's Agency, Ltd., 1976), pp. 175-176.

Nevertheless, both performance parameters were expressly sought for the system, which in turn required variable-sweep wings, moveable inlet ramps, and associated aerodynamic refinements of considerable magnitude in weight, complexity, and cost. Although F-111 aircrews occasionally transit the Mach during low-level egress from the target area in training, this capability cannot be used because of drag penalties when it would be most helpful for mission performance, namely, during run-in to the target with a full external bomb load. Moreover, there is no place in any TAC or SAC F-111 combat sortie profile that I know of that calls for Mach 2 performance at 40,000 feet. Most F-111 crews experience that speed only rarely during the course of their assignment to the aircraft, usually in conversion training (once, to demonstrate the airplane's maximum performance) and on functional check flights following periodic maintenance.

This is not to derogate the versatility of our tactical fighter aircraft.²⁶ My point is simply that "quality" defined solely in terms of technical performance can turn out to be quite ephemeral when examined in an operational setting. If we in the United States are increasingly coming to wonder whether the advertised performance benefits of our fighters would prove uniformly advantageous given their costs in reliability and maintainability, it is only a step away to wonder about the credibility of assertions ascribing comparable capabilities to the Soviets.

In an ideal world, exceptional performance coupled with affordability and high reliability would be the answer to *any* force planner's fondest dreams. Viewed in the abstract, however, technical sophistication is no more a guarantee of mission effectiveness than sheer numbers unaccompanied by the requisite competence at exploiting it. There is more to a fighter force's capability than *either* "quantity" or technical "quality," a fact whose oversight has worked to the detriment of both schools in the American fighter debate.

²⁶One can, of course, ask at what price that versatility has come in terms of compromises in maintainability, and what "better" equal-cost forces might have resulted from a different requirements philosophy.

politics and unanticipated shortfalls in system performance, is all too often an impressive R&D program but only marginal improvement from year to year in the combat leverage of our forces.²⁴

The greatest problem with technical determinism, however, is its tendency to produce statements of "need" based more on what is technologically feasible than on what performance spread is actually called for by most real mission demands. More often than not, the result is to overdesign against the threat by incorporating impressive capabilities of questionable practical value. An example of the excesses that can result from viewing ever-increasing performance as a good thing in itself without regard for combat requirements can be seen in the maximum speed capability built into the F-111. This aircraft, designed to meet extended range-payload and loiter specifications, was also required to fly at better than Mach 2 at high altitude and better than Mach 1 on the deck.²⁵ Although that performance was well within prevailing technology at the time the airplane entered development, little apparent thought was given to the fact that the F-111 would be exposed to lethal SAM fire in the high-altitude regime (even at Mach 2) and would be hard pressed to extract much value from its supersonic dash capability at sea level because of the exorbitant fuel consumption that would be incurred.

²⁴This problem cuts both ways. Military leaders whose watches will have expired long before many force development programs achieve fruition must also worry about balancing the allocation of limited resources among competing procurement, operations and maintenance, and R&D accounts so as to service current needs adequately without mortgaging the future in the process. As always, such resource apportionment decisions will involve hard choices and will ultimately turn on informed judgment calls.

²⁵According to a well-researched study of this program, TAC changed its initial sea-level dash requirement for the F-111 from Mach 0.9 to Mach 1.2 early in the development phase "to differentiate the TFX from the F-105 in order to sell the proposed plane to Air Force superiors." The F-105 had only a subsonic dash capability for extended range on the deck. By this account, TAC assumed that giving the F-111 a supersonic low-level capability would offer "an intuitively compelling indication" of improved performance over the F-105. See Robert F. Coulam, *Illusions of Choice: The F-111 and the Problem of Weapons Acquisition Reform* (Princeton: Princeton University Press, 1977), pp. 41-42.

o'clock and kill. It is capable of flying into and out of situations that we have not seen in other aircraft.... [Yet] even though you may not need some of the fighter maneuvers against an aircraft with lesser performance, you will have to use them when you meet a well-flown enemy aircraft in air combat."²¹

Beyond misplaced confidence that technical sophistication can offset numerical force deficiencies, emphasis on hardware at the exclusion of other factors bearing on mission performance has created additional force-structure problems. One is our well-known tendency to stress "rubber on the ramp," while deferring investment in those mundane support elements needed to assure maximum sustainability.²² Another is the practice of using technology as a means of papering over current problems by optimistic forecasts of improvements in the long haul, instead of confronting those problems head-on with less extravagant correctives that might yield more immediate gains in effectiveness.²³ The result, because of the uncertain vagaries of domestic budgetary

²¹Quoted in Jeff Ethell, *F-15 Eagle*, Modern Combat Aircraft, No. 12 (London: Ian Allen, Ltd., 1981), p. 110.

²²By general consensus, the USAF and the Navy have shown a marked improvement in this area since the late 1970s. However, according to one authoritative account, "even the massive Reagan defense program has tended to shortchange conventional readiness in its unbalanced stress on procurement.... This is evident from charts in DoD's own report, which show that: 1) the Navy's munitions sustainability reached only 20 percent of its goal by end FY84 and will hit only 70 percent even by FY90; 2) for the same category, the Air Force was around 30 percent at the end of FY84 and will reach only 62-63 percent by FY90." By this same account, Secretary Weinberger "increased procurement a cool 51 percent from FY81 through FY84, as compared to an increase of only 17 percent in O&M." Robert W. Komer, "Readiness for What?" *Armed Forces Journal International*, December 1984, p. 131.

²³Necessity being the mother of invention, it is remarkable how well the British have been able to overcome their inability to stay abreast of the United States in the hardware game by offsetting efforts in the realm of training, resource management, and tactical imagination. As a USAF Harrier exchange pilot with the Royal Air Force aptly reflected in this regard, "I consider the RAF to be perversely blessed with a lack of options. They have little or no ECM or all-weather avionics. They have a short list of munitions to load on a limited number of relatively old aircraft. But ironically I believe their lack of sophistication and alternatives has focused their efforts to compensate with training that frankly would water a USAF commander's eyes." Interview with Christopher Bowie of the Rand Corporation.

CONFUSING TECHNICAL SOPHISTICATION WITH MISSION-EFFECTIVENESS

A related failing of threat assessment is its tendency to view technology and its implied performance as the linchpin of enemy capability. This problem is also reflected in the way we strive to assure our *own* security through reliance on promissory notes of what the R&D future portends, often at the expense of needed hedges against the war that might occur tomorrow morning. Of course, staying ahead of the enemy technologically, no less than concern over being quantitatively overwhelmed, is wholly legitimate up to a point. No fighter pilot with the least bit of survival instinct would contemplate going into battle indifferent to the performance of the opposing aircraft and weapons he might encounter.²⁰ By the same token, no force planner worth his trust would sit still for providing operators with weapons whose capabilities were determined solely by affordability, without regard for the environment in which they would be tested.

It scarcely follows, however, that exceptional hardware, any more than numerical abundance, can *by itself* provide a recipe for air combat success. In both cases, such qualities offer significant *potential*, but the extent to which they can be realized will depend heavily on the way they are employed. However impressive a fighter aircraft (with its weapons and avionics) may look on paper, there is nothing foreordained about how well it will perform in combat. In this regard, it is instructive to recall the following injunction of Brig. Gen. Fred Haeffner, former commander of the 58th Tactical Training Wing at Luke AFB, to young F-15 upgraders: "Do not forget common sense.... The F-15 is not a magical airplane. It will not automatically maneuver to six

²⁰He might, however, take a very different view of what mattered than those nominally charged with defining the "threat." In an insightful discussion of the need to "recognize intelligence information that is tactically significant," a former USAF Aggressor intelligence officer recounted how she gradually learned by exposure to operators in the squadron "that thrust-to-weight is more important than max uninstalled sea-level thrust; that corner velocity is usually more meaningful than max airspeed capability; and that energy maneuverability charts are priceless, while computer-generated hi-lo-hi optimum performance profiles are practically worthless." Capt. Rana Pennington, "Behind the Green Door," *USAF Fighter Weapons Review*, Summer/Fall 1983, p. 23.

per sortie.³⁹ Surely it would make little sense to send an expensive fighter like the F-15, with its superb avionics and weapons capability, into combat on day three with nothing but 20mm ammunition because of such a sustainability shortfall.

Last, excessive scenario dependency can subvert rational tradeoffs between weapons "performance" and other needed assets by inducing overconcentration on marginal aspects of the fighter mission. Worst-case planning can severely undermine the achievement of a balanced force when every facet of the threat is perceived to require some variant of a "high" solution. For example, our pursuit of LANTIRN for the night/adverse weather mission, however helpful it may be in denying the Soviet Army a night sanctuary (assuming we can make it work at a price that will let us buy it in enough numbers), bears on just a narrow portion of the larger tactical air mission spread--and at very disproportionate cost.⁴⁰ It will definitely come at a premium in terms of opportunities lost for investing in capabilities needed for fighting in less demanding arenas where such exotic systems would not be required.

One must always, of course, be duly mindful of worst cases. And any approach to force planning must revolve about *some* finite conception of warfare if it is to have any unifying theme and rational coherence. Yet whatever the overriding priorities may appear to be, "there will be other jobs to do," as a British aerospace journal remarked several years ago, "and they are as hard to specify as the enemy's intentions. You can't spell out all the rifleman's targets before designing his rifle."⁴¹ Particularly in the costly and complex business of fighter modernization, a certain elasticity needs to be provided for if dislocations between force composition and operational needs are to be minimized.⁴²

³⁹Benjamin F. Schemmer, "USAF Rebutts OSD Study Charging That Its Technology Fixation Has Sapped Readiness," *Armed Forces Journal International*, March 1981, p. 20.

⁴⁰In its FY86 budget request, the USAF has asked for \$420.7 million for only *ten* LANTIRN sets (not counting spares and RTD&E). See "USAF Stresses Forces Update, Gains in Airlift, Readiness," *Aviation Week and Space Technology*, February 11, 1985, p. 20.

⁴¹"A Fighter Without Neddy-Drag," *Flight International*, May 2, 1981, p. 1213.

⁴²I realize that this is something of a motherhood statement that

As a final caveat, we must also be careful to avoid radical swings in commitment from one restrictive scenario like the NATO contingency to equally narrow circumstances on the opposite extreme, as perhaps typified by our recent preoccupation with Southwest Asia. There may have to be limits placed on pursuing comprehensive multimission capability and greater emphasis on seeking a *true* high-low mix if we are to maintain a fighter force with the greatest possible adaptability.⁴³ This will be a vexing task in the best of circumstances, and no group in the ongoing fighter debate commands a monopoly on the answers. The challenge is to identify and equip ourselves for that middle range between highly mission-specific requirements that yield a force optimized for the grimmest but least likely scenario, and a scattershot approach that endeavors to design against every contingency while providing true adequacy for none.

everybody can agree to in the abstract, and that the real trouble arises when we try to achieve elasticity in specific cases. My point is merely that this dilemma does not admit to easy solutions from *any* quarter and that the tradeoffs ultimately arrived at will necessarily turn on one's conception of operational need. The old aphorism that where you stand depends on where you sit applies with particular force in this regard. What may seem acceptable to a senior Air Staff planner caught up in the daily preoccupations of the budget cycle may prove quite discomfiting to operational commanders gazing down the gunbarrel of the threat. Even more, what the peacetime USAF might uniformly agree to as a force planning solution could strike an Israeli air commander, driven by a very different set of readiness concerns, as an intolerable luxury. This is, by the way, not just a bone of contention between the USAF and the military "reformers," but a topic of serious discussion within the USAF as well. For a balanced comment that gives fair representation to both schools without taking sides, see Bonner Day, "The Pros and Cons of a Multimission Fighter Force," *Air Force Magazine*, April 1979, pp. 20-21.

⁴³I am aware of the intimation often expressed that in the broader view, the United States maintains the "high" end of the tactical air mix, while its NATO allies provide the "low" end. For that argument to stick, however, we will need to show far greater evidence of interoperability and planning harmony with our principal NATO partners than is currently the case. For a forceful elaboration on this point, see Robert W. Komer, *Maritime Strategy or Coalition Defense?* (New York: University Press of America, 1984).

WHERE CAN WE GO FROM HERE?

This essay has argued that incomplete threat assessments and selective definitions of operational need can severely hamper the balanced development of our tactical air posture. Although it has tried to avoid taking sides in the debate, it has voiced deep concern over the adverse consequences that are bound to catch up with us sooner or later if our propensity to develop fighters of ever-increasing sophistication at ever-increasing cost is not brought under better control.⁴⁴ Insofar as such "improvements" must come at the price of reduced sustainability and training, it is a matter of legitimate worry (not just among military "reformers") whether their avowed benefits will ever offer enough operational leverage to be useful in a serious test of strength with the Soviets.

What a "better" or more rational fighter force informed by the expanded threat-assessment approach outlined above would look like is hard to say in the abstract. Ultimately, it will depend on the judgment of those professionals responsible for employing the forces. As numerous episodes in the history of fighter aviation attest, those choices can be made wisely or poorly depending on the premises and motivations of the decisionmakers involved. But it seems fair to say that the using service has reasonable claim to a substantial right, if not a monopoly on expertise, to determine within available budgets the character of the weapons it will take into combat.⁴⁵

⁴⁴By some reports, the F-15E may cost upward of \$60 million a copy. Even if everybody agrees that it is a dream machine, how many can we realistically afford to buy at that price?

⁴⁵Alongside that prerogative, however, is a responsibility to be coldly unsentimental about priorities at a time of unusual fiscal stress. If the services fail to exercise the discipline needed to pursue programs realistically to maintain credibility with the Executive Branch and the Congress, such discipline will be imposed sooner or later from without by the inexorable demand for budgetary stringency. Insofar as that discipline will come from nonprofessionals (often with hidden agendas of their own), many vital programs--and the national interest--may suffer in the process.

What is suggested here is that such a force could look marginally different from our present one in size, composition, and serviceability, with enough gains in leverage and reduced cost from saying "no" with greater frequency to excessive promises from the R&D world to help underwrite some of our major underfunded readiness needs. How might a broadened threat conception (and associated data base) produce a commensurate return in future fighter development? For one thing, a full-view image of enemy capability--including his operational and tactical weaknesses--would reduce the threat from its usual "ten-foot tall" stature down to more manageable proportions. When factored with appropriate weighting into the requirements process, it might suggest areas where useful tradeoffs could be considered between numbers and "quality," on the one hand, and properly adapted tactics and training, on the other.

Assuming a fixed budget apportioned in seemingly balance among R&D, procurement, operations and maintenance, and training accounts, such tradeoffs might in turn yield a fighter force larger, more diversified, less uniformly complex, and more faithful to the high-low principle than our current one, yet also more mission-effective due to collateral improvements in maintainability and aircrew proficiency.⁴⁶ To what extent such tradeoffs can be achieved in practice must remain a matter for the fighter community itself to determine. A concerted effort to find out, however, might begin with the following steps:

1, **Improved collection on enemy operations and training.** In recent years, there has been a considerable upsurge of attention to trends in Soviet tactical aviation throughout the U.S. intelligence community. For the most part, however, it has remained limited to things that lend themselves to easy quantification: order of battle trends, force deployment patterns, aircraft and weapons performance details, and the like. There has been far less tasking of resources toward broadening our knowledge about Soviet operating repertoires,

⁴⁶A full-spectrum visual mission simulator at every fighter base (or at least at every RTU) would definitely offer a promising advance in this regard. Although it could never substitute for actual flying time, it could pay for itself many times over by making each sortie more productive and each aircrew more proficient as a result.

tactical concepts, command virtuosity, training patterns, exercise behavior, and aircrew skill. Admittedly, such information is hard to come by and is highly subjective even when available. Nevertheless, it concerns a vital dimension of enemy capability whose neglect in threat assessment will result in an incomplete image of the operational challenge facing U.S. planners.

2) **Greater involvement of operators in threat assessment.** ^{and} Most analysis of threat data is done by career intelligence people unfamiliar with the operational side of the fighter business. Accordingly, much of the pertinent information on enemy air activity is prone to being misinterpreted or ignored. There are exceptions, such as the 57th Fighter Weapons Wing at Nellis AFB and the Navy Fighter Weapons School at Miramar, where fighter pilots are directly exposed to the latest on enemy weapons and tactics.⁴⁷ This exposure, however, is primarily occasioned by training needs rather than by any independent demand for expert analysis. Although some of our fighter weapons instructors are well conversant with the operating practices of their Soviet counterparts, their training duties place the primary demand on their time and largely rule out the tapping of their knowledge to much effect in the threat evaluation process. Pilots with fighter backgrounds who occasionally *do* draw intelligence tours generally do so through happenstance rather than design. Most fighter pilots try to avoid such assignments because of their belief (generally correct) that entry into the intelligence world involves a one-way street with little prospect of returning to the cockpit.

This problem could be ameliorated--and tactical air threat assessment substantially improved--by a shift in rated force management that expressly provided for experienced fighter pilots (especially those with Aggressor backgrounds) to serve their non-flying staff tours in the intelligence community.⁴⁸ Such a practice might encounter resistance at first both from intelligence professionals concerned over having their

⁴⁷For graphic accounts of these activities, see Michael Skinner, *Red Flag* (Novato, California: Presidio Press, 1984), pp. 23-49, and Ehud Yonay, "Top Guns," *California Magazine*, May 1983, pp. 94-106.

⁴⁸The Aggressor program entails four squadrons (two at Nellis and one each in USAFE and PACAF) that fly the F-5 as a MiG-21 surrogate using known Soviet tactics to provide realistic air combat training to

turf invaded by interlopers and from fighter pilots themselves, who would undoubtedly prefer to continue doing what they enjoy most. Yet with the right incentives (including ironclad assurances of an early return to the operational world), assignments to intelligence would make at least as much sense as other rated supplement tours for fighter pilots.⁴⁹ Putting junior and midcareer officers with fighter experience and a talent for analysis directly into the national intelligence process might substantially enhance the richness of the resultant product on tactical issues.⁵⁰

3) **Incorporation of enemy vulnerability analysis into operational planning.** Weaknesses in resource management, command and control, aircrew skill, and similar "soft" areas can significantly degrade the effectiveness of otherwise well-endowed fighter forces. We have such problems, and so do the Soviets. Some are transitory products of passing fads in leadership, personnel management, operating philosophy, and training style that can be corrected by appropriate policy reforms. Others are more deeply rooted in military culture and less amenable to change. Both categories of weakness, however, should be identifiable through careful study of available data on enemy repertoires and training approaches. Insofar as their exploitation could yield commensurate payoffs in our own leverage, there is every reason to include them as factors bearing on U.S. fighter force planning.⁵¹

USAF fighter units. For discussion, see Charles Gilson, "Tiger On Your Tail," *Flight International*, March 12, 1977, pp. 650-656.

⁴⁹A good example of what I am describing here is Project Checkmate, a headquarters-level activity in the Air Force's Directorate of Operations aimed at enhancing USAF tactical employment planning by contributing informed insights into Soviet operational styles and vulnerabilities. It is staffed largely by officers with solid fighter credentials and has produced some of the better studies of Soviet theater-war potential from an operator's perspective. For an overview, see Capt. James Lawrence, "Readiness: Project Checkmate," *Aerospace Safety*, September 1978, pp. 1-5.

⁵⁰Most people in the fighter community who press for greater operator input into the intelligence process are primarily motivated by concern for getting the right kind of threat information properly disseminated down to the cockpit level. What I have in mind is to draw on that same expertise for assuring that the right kind of threat appraisals flow in the *opposite* direction, namely, to those senior officials who use the intelligence product as a primary basis for fighter force planning.

⁵¹We should also be wary of quick conclusions that while the Soviet

To do so effectively, however, we need better methods for converting human performance data into metrics that can be rigorously applied in mission-area analysis. Although this will be inherently difficult because of the elusiveness and ambiguity of so much of the pertinent data, there is a compelling demand for techniques that might take us beyond simple anecdotalism (or "arm-waving," in a less charitable expression) toward more disciplined and credible application of largely impressionistic threat information.⁵² With such considerations duly weighted alongside the more technical aspects of enemy forces, U.S. planners would at least command a more sophisticated and realistic appraisal of enemy capability. In all likelihood, because of irreducible uncertainties regarding the evidence bearing on enemy combat prowess, decisionmakers will remain understandably reluctant to pass up hardware enhancements in favor of greater support to training and readiness solely on the strength of those assessments.

Air Force may have serious operational deficiencies today, it can easily change its ways once it sees the light and decides to move. In this regard, John Erickson has suggested that Frontal Aviation leaders are purposely moving cautiously on the tactics front while they consolidate the basic transition, logistics, and management problems associated with their ongoing force modernization. Once this is completed, Erickson anticipates that the Soviet Air Force will progressively show "a greater interest in tactical ingenuity, aircrew proficiency, and more flexible training." "The Expansion of Soviet Air Power," in E. J. Feuchtwanger and Group Captain R. A. Mason, eds., *Air Power in the Next Generation* (London: Macmillan, 1979), pp. 64-65. A similar view is offered by Capt. Rana J. Pennington in her "Closing the Tactics Gap," *Air Force Magazine*, March 1984, pp. 83-88. For such a change to occur, however, the Soviet Air Force will have to abandon a tradition of centralized control that dates back to pre-World War II days and is deeply ingrained in Russian culture.

⁵²Some promising steps in the right direction are Edward T. Timperlake and Steven Leveen, *A Method for Estimating Comparative Aircrew Proficiency* (Arlington, Virginia: The Analytical Sciences Corporation, TR-3381-1-2, May 22, 1981), and Col. Joseph Hurd, Cdr. George More, Col. Thomas Owens, and Lt. Col. Michael Press, "Measuring Aircrew Capabilities for PPBS," unpublished research paper (Washington, D.C.: National War College, February 1984). Both studies were written by experienced fighter pilots. See also Peter deLeon, *The Peacetime Evaluation of the Pilot Skill Factor in Air-to-Air Combat* (Santa Monica: The Rand Corporation, R-2070-PR, January 1977). The problem in using such techniques to evaluate enemy air combat prowess, of course, is finding enough reliable information to produce a representative data base.

Nevertheless, a deeper appreciation of how the enemy would be likely to fight could add immeasurably to the "big picture" of force planners and operators alike. It might also help place in a properly jaundiced light those more extravagant proposals for force "improvement" that hard-headed sensitivity analysis might suggest could be safely passed up (or deferred) in the interest of supporting more immediate and pressing operational needs.

In comparison to the sweeping proposals one routinely hears in the fighter debate (greater numbers of more austere aircraft, continued pursuit of force multipliers through reliance on technology, and even accelerated funding for both numbers *and* "quality"), the suggestions outlined here envisage a more balanced distribution of resources available to the tactical air forces within *existing* funding levels. By thinking about the threat in operational terms and contemplating our requirements in a campaign context rather than through simple force-on-force comparisons, we might over time develop greater enthusiasm for capability enhancements emanating mainly from tactical creativity and astute resource management rather than from engineering solutions of the sort that large defense budgets all too easily encourage.

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